

Docket No. 9958-002-27 CONT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE APPLICATION OF: JOHN SHANNON ET AL.

SERIAL NO: NEW CONTINUATION APPLICATION

FILING DATE: HERewith

FOR: METHODS AND ORGANISMS FOR CONCENTRATING AND  
RECOVERING METALS AND MINERALS FROM AQUEOUS MEDIA

**PRELIMINARY AMENDMENT**

ASSISTANT COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231

SIR:

Prior to examination on the merits, entry of the following amendments to the above-captioned patent application is respectfully requested.

**IN THE CLAIMS:**

Please cancel Claims 1-22.

Please add new Claims 23-32 as indicated below.

--23. (New) A method of recovering metals and minerals from sea water, comprising:  
contacting a sponge that harbors bacteria capable of concentrating said metal or  
mineral with sea water to concentrate the metal or mineral in the bacteria; and  
recovering the concentrated metal or mineral from the bacteria.

24. (New) The method of Claim 23, wherein said bacteria is a transgenic bacteria that  
expresses a heterologous gene that encodes a protein that improves the ability of said bacteria  
to concentrate said metal or mineral.

25. (New) The method of Claim 23, wherein said sponge is a transgenic sponge that expresses at least one heterologous gene that encodes a protein that effects concentration of the metal or mineral in the sponge.

26. (New) The method of Claim 23, wherein said bacteria is selected from the group consisting of *Bacillus cereus*, *Citrobacter intermedius*, *Acetobacter methanolicus*, *Thermothrix thiopara*, *Phormidium*, *Oscillatoria*, *Mastigocladus*, *Thiobacillus ferrooxidans*, *Thiobacillus*, *Thiooxidans*, *Bacillus lichenformis*, *Bacillus BKPM 4368*, *Pedomicrobium* and *Bacillus subtilis*.

27. (New) A method of recovering metals and minerals from sea water, comprising: contacting a *Cenarchaeum symbiosum* with said sea water; and recovering concentrated metal or mineral from said *Cenarchaeum symbiosum*, wherein said *Cenarchaeum symbiosum* comprises marine sponge and associated archaea.

28. (New) A method of recovering gold from sea water, comprising: contacting a sponge harboring *Pedomicrobium* with said sea water; and recovering concentrated gold from said sponge harboring *Pedomicrobium*.

29. (New) A method of recovering metals and minerals from sea water, comprising: contacting a sponge harboring *Cyanobacteria* with said sea water; and recovering concentrated metal or mineral from said sponge harboring *Cyanobacteria*.

30. (New) A method of recovering metals and minerals from sea water, comprising: contacting a sponge with said sea water; and recovering concentrated metal or mineral from said sponge, wherein symbiotic bacteria indigenous to said sponge are modified to include bacteria capable

of accumulating said metal or mineral.

31. (New) A method of recovering metals and minerals from sea water, comprising:  
cultivating sponges in a sponge bed, wherein said sponges harbor bacteria capable of  
accumulating said metal or mineral;  
permitting said metal or mineral to accumulate; and  
recovering concentrated metal or mineral from said sponges.

32. (New) A method of recovering metals and minerals from sea water, comprising:  
contacting a transgenic sponge with sea water to concentrate the metal or mineral in  
the bacteria, wherein the sponge expresses at least one heterologous gene that encodes a  
protein that effects concentration of the metal or mineral in the sponge and wherein the  
sponge harbors bacteria capable of concentrating said metal or mineral; and  
recovering the concentrated metal or mineral from the sponge.--

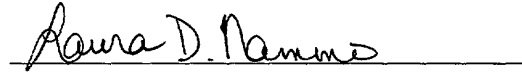
#### REMARKS

Claims 1-22 are canceled. Claims 23-32 are added. Applicants respectfully request  
that the Examiner consider the foregoing Preliminary Amendment upon initial consideration  
on the merits of the present application. Applicants submit that the Preliminary Amendment

does not introduce new matter. Accordingly, Applicants submit that this application is in condition for examination and favorable consideration is respectfully requested.

Respectfully submitted,

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